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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,373	04/16/2004	Atsushi Sakai	251943US2	8393
22850	7590	09/29/2005	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			DOAN, JENNIFER	
			ART UNIT	PAPER NUMBER
			2874	
DATE MAILED: 09/29/2005				

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	Application No.		Applicant(s)	
	10/825,373		SAKAI ET AL.	
	Examiner		Art Unit	
	Jennifer Doan		2874	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 April 2004.
- 2a) ☐ This action is **FINAL**.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-19 is/are pending in the application.
 - 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 2-8 is/are allowed.
- 6) ☒ Claim(s) 1 and 9-19 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 - a) ☒ All b) ☐ Some * c) ☐ None of:
 - 1. ☒ Certified copies of the priority documents have been received.
 - 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>082704</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

2. The prior art documents submitted by applicant in the Information Disclosure Statement filed on 8/27/04, have all been considered and made of record (note the attached copy of form PTO-1449).

Drawings

3. The drawings, filed on 04/16/04, are accepted.

Specification

4. Applicants' cooperation is requested in correcting any errors of which applicants may become aware in the specification.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1, 9-12 and 14-19 are rejected under 35 U.S.C. 102(e) as being anticipated by Shirane et al. (U.S. 6,937,781).

With respect to claim 1, Shirane et al. (figures 3(a), 3(b) and 8) disclose a light control element comprising a substrate (31); an optical coupling component formed on the substrate by a photonic crystal structure (abstract and figure 3(b)); and part provided a variable refractive index part (33, 34) provided in a part of the photonic crystal structure so as to divide the optical coupling component into two regions (figure 8), wherein a traveling direction of a light is changed at an interface of the regions by changing a refractive index at the variable refractive index part such that there is caused reflection for at least one wave number of the light (abstract and column 3, lines 37-49).

With respect to claim 9, Shirane et al. (abstract) disclose the light control element, wherein the photonic crystal includes a defect region.

With respect to claim 10, Shirane et al. (figure 3(b)) disclose the light control element, wherein the photonic crystal includes at least two layers of photonic crystal arrays (33, 34) at both sides of the defect region, a refractive index being changed for the defect region (abstract).

With respect to claim 11, Shirane et al. (figure 3(b)) disclose the light control element, wherein the photonic crystal includes least two layers of photonic crystal arrays (33, 34) at both sides of the defect region, a refractive index being changed for the entirety of the photonic crystal (abstract).

With respect to claim 12, Shirane et al. (figure 3(b)) disclose the light control element, wherein the photonic crystal includes at least two layers of photonic crystal arrays (33, 34) at both sides of the defect region, each of the photonic crystal arrays including the same number of layers.

With respect to claim 14, Shirane et al. (figures 1(b) and 2) disclose the light control element, wherein the photonic crystal has a structure having a wave vector component of a light incident to the defect region through the photonic crystal in a direction other than the direction perpendicular to the elongating direction of the defect region.

With respect to claim 15, Shirane et al. (figure 3(b)) disclose the light control element, wherein the photonic crystal includes plural defect regions of different sizes (abstract).

With respect to claims 16 and 17, Shirane et al. (figures 3(a), 3(b) and 7) disclose a light control element comprising a substrate (31) having a photonic crystal structure; a plurality of optical waveguides (figure 7) formed the photonic crystal structure in the form of a line defect of the photonic crystal structure (figure 7); and a variable refractive index part (33, 34) formed in an optical coupling part in which the optical waveguides intersect with reach other (figure 7), the light control element controlling a state of

Art Unit: 2874

resonance in the optical coupling part by changing a refractive index of said refractive index variable part (abstract) .

With respect to claim 18, Shirane et al. (figures 3(a), 3(b) and 7) disclose a light control element, comprising a substrate (31); NXN optical waveguides (figure 7) formed on the substrate so as to cross with each other at intersections distributed two-dimensionally on the substrate (abstract); and N^2 optical coupling components each provided to one of the intersections of the optical waveguides (figure 7), variable refractive index part provided to each of the optical coupling component (figure 7), each of the variable refractive index part forming a light control element of any of the first through fourteenth aspect of the present invention (abstract).

With respect to claim 19, Shirane et al. (figures 3(a), 3(b) and 7) disclose a light control element, comprising a substrate (31) having a photonic crystal structure; NXNXN optical waveguides (figure 7) formed in the photonic crystal structure of the substrate so as cross with each other at intersections distributed two dimensionally on the substrate (abstract) and an optical coupling part formed each of the intersections (figure 7), the optical coupling part including a photonic crystal forming a variable refractive index part (abstract).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shirane et al. (as cited above).

With respect to claim 13, Shirane et al. substantially disclose the light control element except the number of layers of the photonic crystal array is ten or less.

However, the number of layers of the photonic crystal array being ten or less is considered to be obvious, since the switching capacity is dependent on the photonic crystal structure. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the number of layers of the photonic crystal structure of Shirane's device with the value as claimed for the purpose

Art Unit: 2874

of obtaining the maximum switching capacity, and it also has been held that discovering an optimum value of a result effective variable involves only routine skill in the art and it is noted that the applicant does not disclose criticality in the value claimed. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (see MPEP § 2144.05).

Allowable Subject Matter

10. Claims 2-8 are allowed.

The prior art of record fails to disclose or reasonably suggest a light control element comprising an interface between the regions incident changes a traveling direction of a light incident thereto by causing reflection in at least one wave number of the light in response to a change of refractive index in the variable refractive index part as recited in claim 2; wherein at least three of the optical waveguides being coupled to the optical coupling component and the light control element changing a transmittance of light through the optical waveguide as recited in claim 3; a plurality of variable refractive index parts formed in the polygonal optical coupling component, the plurality of variable refractive index parts being formed in one or more regions of the polygonal optical coupling component divided from each other by a diagonal line as recited in claims 4-6; and the first photonic crystal including a structure for reflecting or transmitting a transverse electric mode wave, the second photonic crystal including a structure for reflecting or transmitting a transverse magnetic mode wave; and variable refractive index parts provided respectively by the first and second photonic crystals, the

Art Unit: 2874

first variable refractive index part and the second variable refractive index part respectively changing a transmittance of the transverse electric mode wave and a transmittance of first and second the transverse magnetic mode wave each other, independently from the light control element separating a transverse electric mode wave and a transverse magnetic mode wave in response to a change of refractive index of the first and second variable refractive index parts as recited in claims 7 and 8.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Fukushima et al. (U.S. Patent 6,822,784) disclose a light beam deflection with photonic crystal optical switch.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jennifer Doan whose telephone number is (571) 272-2346. The examiner can normally be reached on Monday to Thursday from 6:00 am to 3:30 pm, second Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Rodney Bovernick can be reached on (571) 272-2344. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Art Unit: 2874

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

A handwritten signature in black ink that reads "Jennifer Doan". The signature is written in a cursive style with a large initial "J" and a long, sweeping underline.

Jennifer Doan

Patent examiner

September 26, 2005